

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

## **IMAGES ARE BEST AVAILABLE COPY.**

As rescanning documents *will not* correct images,  
Please do not report the images to the  
Image Problem Mailbox.

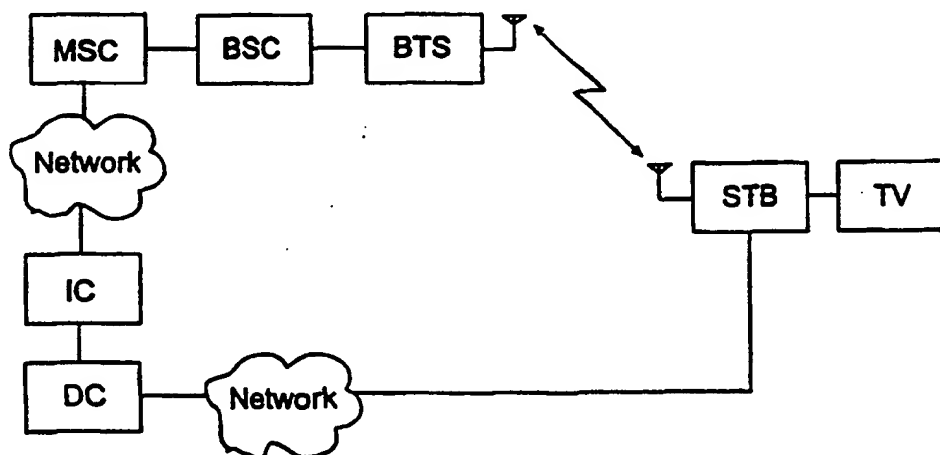
**THIS PAGE BLANK (USPTO:**



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H04N 7/173, H04B 7/26</b>	<b>A1</b>	(11) International Publication Number: <b>WO 98/56181</b> (43) International Publication Date: 10 December 1998 (10.12.98)
<p>(21) International Application Number: PCT/SE98/00983</p> <p>(22) International Filing Date: 26 May 1998 (26.05.98)</p> <p>(30) Priority Data: 9702146-3 5 June 1997 (05.06.97) SE</p> <p>(71) Applicant (for all designated States except US): TELIA AB [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): TEGLER, Susanne [SE/SE]; Stenåldersvägen 163, S-226 54 Lund (SE). WICKMAN, Johan [SE/SE]; Trädgårdsvägen 21, S-237 35 Bjärred (SE). BENGTSSON, Roger [SE/SE]; Norregatan 21, 3tr, S-211 27 Malmö (SE).</p> <p>(74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).</p>	<p>(81) Designated States: EE, JP, LT, LV, NO, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>	

(54) Title: SYSTEM AT TELECOMMUNICATIONS NETWORK



## (57) Abstract

The invention relates to a system at GSM which provides interactive control of broadband services. There are today systems which offer distributive services, for instance analog cable-TV, analog satellites and analog terrestrial TV-networks. A paradigm shift, however, has been initiated in connection with that digital transmissions have started, which make possible a more spectrum efficient transmission. This means, for instance, that a broadband service such as digital transmission of video channels can be developed by making it interactive. One solution can be to use the GSM-system. For example, services which require low capacity in uplink can utilize the SMS-function in GSM. At larger demand of bandwidth GSM's data services can be utilized, which however prevents calls when the telephone is used for interactive communication. The invention solves this problem by interactive traffic between the transmitting and receiving equipment being managed by an interactive centre (IC) which is arranged to execute wanted broadband service. IC in addition is in connection with a distributive centre (DC) for distribution of the broadband signals out on the telecommunications network.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

TITLE OF THE INVENTION:  
SYSTEM AT TELECOMMUNICATIONS NETWORK

5

## FIELD OF THE INVENTION

The present invention relates to a telecommunication network which provides interactive control of broadband services.

10

## PRIOR ART

Today there are several systems which offer distributive services, for instance analog cable-TV networks, analog satellites and analog terrestrial TV-  
15 networks. A paradigm shift, however, has begun in connection with that digital transmissions have started. Digital transmissions make possible more spectrum efficient transmissions, and that a more individual or target group directed content can be transmitted in a cost efficient  
20 way. A leading organisation concerning digital transmission is DVB (Digital Video Broadcast; cooperation between ETSI, EBU and CENELEC) which has produced specifications for transmission of MPEG-2-encoded data via satellite, terrestrial, cable, radio below 10 GHz and radio over 10  
25 GHz. Another organisation with similar aim and direction is DAVIC, the work of which also includes protocol for ATM-transport.

A broadband service such as digital transmission of  
30 video channels can be developed by making it interactive. This means that the user can get access to functions such as selecting a film and wind or rewind the film. In addition to video-on-demand one may conceive other suitable interactive services, for instance training and shopping.  
35 Smallband interactivity is expected to be sufficient for a

not unessential number of the users during a rather long time ahead.

One also should mention the very popular use of "web-browsers" over Internet. This type of service even today is interactive, but with a growing need of bandwidth, above all for downlink, i.e. towards subscriber.

Interactivity can be created in a number of different ways. The common, fixed telephone network, PSTN (Public Switched Telephone Network), can be utilized, which however implies that the operator has access to this. A problem just is that a Swedish operator in most cases lacks the possibility to act as an operator abroad.

Another problem with a PSTN-solution is that incoming and outgoing calls are prevented during the time when the line is used as an interactive channel, unless a separate line is not utilized.

One more problem with PSTN is that a changed paradigm for telephony can be observed, above all with the younger generation. It is expected to be more and more common that households do not acquire a fixed subscription but will be satisfied with one or more mobile telephone subscriptions.

The aim of the present invention consequently is to solve these problems.

### SUMMARY OF THE INVENTION

This above mentioned aim is achieved by a system at a telecommunications network which provides interactive control of broadband services, at which said telecommunications network is a cellular, wireless, telecommunications network which is utilized as interactive control channel to said broadband services.

The invention consequently solves the problem of creating a narrowband interactive channel at low cost without, for instance, existing copper line needing to be utilized. The invention is an advantageous solution for persons who only has a mobile telephone subscription. The invention also gives an operator possibility to offer interactivity at low cost abroad, either themselves or in cooperation with a GSM-operator.

The services which are discussed will be utilized in the homes, where the main use is expected to be in the evenings and during holidays, i.e. during times when the GSM-network is not utilized at its full capacity, because of that the otherwise intensive use by companies then is limited. Services which require low capacity in uplink can make use of the SMS-function in GSM, which makes it possible to make or receive calls at the same time. At larger need of bandwidths, GSM's data services can be utilized, which however prevent incoming and outgoing calls when the telephone is used for interactive communication.

Further advantages are that the invention makes mobility possible in the sense that a customer can utilize a SIM-card to approve of orders and perform commands at just any terminal connected to the system.

The invention also makes possible a symmetric data channel if, for instance, a computer is connected to a set-top box.

Further embodiments and characteristics of the invention are given in the independent patent claims.

#### BRIEF SUMMARY OF THE DRAWINGS

In the following, detailed embodiments of the present invention are given with reference to the enclosed drawings, where

Figure 1 is a diagrammatic survey of the system according to the invention;

Figure 2 is a first embodiment of how a subscriber can achieve interactivity by means of the system in Figure 1;

Figure 3 is a second embodiment of how a subscriber can achieve interactivity by means of the system in Figure 1;

Figure 4 is a third embodiment of how a subscriber can achieve interactivity by means of the system in Figure 1;

Figure 5 shows the system according to Figure 1 where a GSM-telephone handles the interactive communication, independent of an STB.

#### DETAILED DESCRIPTION OF EMBODIMENTS OF THE PRESENT INVENTION

In the following, first a number of abbreviations which are used in the description will be explained. Then the invention will be described in principle with reference to Figure 1. Preferred embodiments according to the Figures 2-5 after that will be discussed.

20	BSC	Base Station Controller
	BTS	Base Tranceiver Station
	CA	Conditional Access
	CLIP	Calling Line Identification Presentation
	DC	Distributive Central
25	GPRS	General Packet Radio Service
	GSM	Global System for Mobile Communications
	HSCSD	High Speed Circuit-Switched Data
	MCS	Mobile Switching Center
	PIN	Personal Identification Number
30	PSTN	Public Switched Telephone Network
	IC	Interactive Central
	SMS	Short Message Service
	STB	Set Top Box

35 The cellular wireless communication network which is utilized in the embodiments especially relates to GSM. It



should of course be realized that in principle just any cellular wireless communications system can be used.

By GSM is meant in the embodiments digital cellular mobile telephone systems such as GSM, DCS-1800, PCS-1900, IS-95, PDC, D-AMPS and corresponding. Further are related to cellular short distance systems such as DECT, PHS and PACS. Future cellular third generation system such as UMTS, FPLMTS also are related to.

By broadband service is meant a type of larger information transmission to a user, for instance transmission of a video film. We regard a service as broadband when the transmission rate is 2 Mbit/s or higher. The broadband service can, as has been mentioned above, for instance be distributed according to DVB's specifications for satellite, cable etc, or corresponding DAVIC specifications.

In the description below, the conception set-top-box (STB) is used. By this conception is related to a stand-alone equipment which at the user converts the incoming broadband signal to a signal which is adapted to the TV, the computer etc.

A broadband service such as digital transmission of video channels, in a simple and cheap way can be made interactive by utilizing the existing GSM-network. The subscriber can achieve interactivity in three different ways:

1. Set-top-box with SIM-card reader and built-in radio equipment for GSM. This alternative is primarily aimed at subscribers who do not have access to a mobile telephone (see Figure 2).
2. Set-top-box without built-in radio equipment for GSM, but with connection for an external mobile telephone (see Figure 3, 4).
3. Separate GSM-telephone which functions as a remote control (see Figure 5).

The interactive traffic between STB or GSM-telephone and BTS passes via BSC, MSC and a network to an interactive centre IC, (see Figure 1). IC communicates with a distributive central, DC, which provides broadband services, for instance video-on-demand etc. IC consequently receives interactive instructions from STB or mobile telephone, which instructions are recoded and transmitted to DC. DC then transmits broadband services corresponding to said instructions via networks to the STB as can be seen in Figure 1. In, for instance, Figure 2 is shown that the incoming broadband signal is received by the video decoder in the STB. The STB after that converts the broadband signal to a signal which can be received by for instance the TV.

For transmission of interactive data in downlink to customer, both the broadband broadcast channel and GSM's downlink can be utilized. Selection can be made depending on type of data. For instance, DBV is at present producing protocols for data broadcast which makes possible for the set-top-box to find data information in the broadcast channel.

By using the GSM-network as interactive channel for distributive services, the network is utilized at times in the 24 hour periods when the load normally is low. The need of an expensive extension or new built-up of an interactive network for broadband services can by that initially be reduced or avoided.

If the GSM-subscription in this way is utilized, for instance, to order a film, the cost for this then can be debited the customer on the GSM-invoice. At shopping-on-demand, the customer in the same way can be debited via the mobile telephone invoice. This means that the SIM-card is utilized as a credit card.

Another possibility is to connect the SIM-card to an ordinary credit card which the customer has. This means

that the responsibility to transmit money is laid on the credit company at for instance shopping-on-demand.

GSM also can be used as CA-system (Conditional Access), because GSM supports encryption, authenticating and PIN (Personal Identification Number).

In the embodiment in Figure 2, the set-top-box contains radio equipment for a GSM-terminal and a SIM-card reader. The SIM-card reader should be adapted so that both the large and small version of SIM-cards fit.

The radio equipment in principle can be simplified because the STB is stationary, and parts such as channel equalizer and channel encoder can be excluded, or at least be simplified.

The communication between user and set-top-box is done by remote control or keyboard. The keyboard either can be directly connected to the set-top-box or connected via a computer.

The customers who do not have a GSM mobile telephone subscription should be offered a subscription which is adapted to the interactive channel. As added value this SIM-card also should be possible to use for conventional mobile telephony.

The users who already have a mobile telephone can utilize a set-top-box, which lacks radio equipment, and instead utilize the mobile telephone. The set-top-box then neither need to contain a SIM-card reader. The mobile telephone is connected to the set-top-box by means of a cable and possibly also a PC-card (see Figure 3).

Utilization of a standardized interface is desirable. This makes possible that only the cable need to be changed if the subscriber changes mobile telephone model.

The communication between customer and set-top-box is executed by means of remote control or keyboard. The keyboard can either be directly connected to the set-top-box, or be connected via a computer.

In an alternative embodiment of the invention an IR-based remote control is utilized to control TV, STB and GSM-telephone (see Figure 4). In this embodiment an IR-interface is connected or integrated to, or in, the GSM-telephone. The IR-based interface consequently can be used as connection between the GSM-telephone and STB. The invention includes that STB and GSM can communicate via IR directly or via remote control.

The above construction implies a simplified connection of the GSM-telephone for the user.

It should be noticed that the IR-technology which is included in the invention can be either:

- \* directive (today's normal IR-technology, one has to "point" with the remote control), or
- \* diffuse. The diffuse IR-technology will probably be of great importance in the future. Diffuse IR results in that the user need not point "in correct direction" because the IR-communication in this case is omnidirectional and utilizes reflections in walls and other objects in the close neighbourhood.

In Figure 5 is shown a GSM-portable which is not connected to the set-top-box, but yet is utilized to effect an interactive channel. By transmitting a data sequence to the interactive centre (IC) via BTS etc. the user can control the broadband channel in downlink. This solution does not make possible the same automaticity but requires that the customer himself/herself attends to that correct sequence and number is dialled.

No communication related to the interactive services is executed in this case between the mobile telephone and the set-top-box, but via the GSM-telephone and the IC. The user in this case acts as interface between the mobile telephone and for instance the TV-screen.

The communication channels (carrier services) below are related to GSM. The corresponding carrier services can be utilized in the above mentioned system.

5    Interactive channel via SMS

A small amount of information can be transmitted as messages via SMS. In order to get a faster communication a separate SMS-SC can be created for the service. SMS-SC in this case is the interactive centre.

10

Interactive channel via ordinary circuit switched connection

A circuit switched connection should be used when higher capacity is required than the one at SMS. In present  
15    standard issue (phase 2) data services with a rate of max. 9,6 kbit/s are supported.

Interactive channel via GPRS

In the work with GSM phase 2+ the standardization of  
20    packet switched data transmission is going on to support an efficient transmission of traffic in bursts. GPRS is expected to support instantaneous data rates at up to about 100 kbit/s. The GPRS-standard is expected to be ready in 1998 with an expected introduction on the market one or two  
25    years later.

Interactive channel via HSCSD

In order to support circuit switched data services with higher data rate, there are in the phase 2+-work  
30    produced specifications which will support up to 64 kbit/s. The HSCSD-standard will be ready in 1997 with an expected introduction on the market one to two years later.

The interactive centre, IC, can be located with the one who offers the distributive service. IC must be in  
35    connection with the distribution centre, DC, which can be

physically located together. CLIP can be used to identify calling party.

As has previously been mentioned, the invention can be used to create an interactive channel to broadband services, for instance video-on-demand and high speed internet access. The invention in addition can be of great importance at markets where the operator does not in a simple way have at his/her disposal a fixed access network, PSTN. The invention also can be used as a complement for subscribers who are lacking a fixed subscription or do not want to utilize the fixed subscription.

The invention consequently offers an extended field of application of GSM-telephones and GSM-systems, which may contribute to increasing revenues and that repayment of the big investments which are made in the GSM-system will be made faster. The coming extension of GSM in the 1800 MHz-band (DCS1800), in addition probably will make possible extended fields of use for GSM thanks to the heavily increased capacity which is set free.

The above mentioned is only to be regarded as advantageous embodiments of the invention, and the extent of protection of the invention is only defined by what is indicated in the following patent claims.

## PATENT CLAIMS

1. System at a telecommunications network which provides interactive control of just any broadband services, c h a r a c t e r i z e d in that said telecommunications network is a cellular, wireless telecommunications network arranged, in said system, to be utilized as interactive control channel to said just any broadband services.

2. System according to patent claim 1, c h a r a c t e r i z e d in that interactive traffic corresponding to control traffic to just any broadband service is transmitted from a mobile terminal to a base station via said interactive control channel, which interactive traffic is transmitted to an interactive centre, IC, which is arranged to manage said interactive traffic and execute said just any broadband service.

3. System according to patent claim 2, c h a r a c t e r i z e d in that said IC is connected to a distributive centre, DC, at which said IC transmits instructions on basis of said interactive control traffic to said DC, which DC distributes said broadband service via a network to a converter which can cooperate with the mobile telephone.

4. System according to patent claim 3, c h a r a c t e r i z e d in that said DC utilizes DVB for transmission of said broadband service to said converter and that said mobile terminal is a GSM-terminal.

5. System according to patent claim 4, c h a r a c t e r i z e d in that said converter is an STB connected to said GSM-terminal and to video receiver, which video receiver decodes said broadband service and presents said service on a computer screen/TV-receiver.

6. System according to any of the patent claims 4, or 5, c h a r a c t e r i z e d in that interactive traffic

in uplink with low capacity utilizes the SMS-function in GSM.

7. System according to any of the patent claims 4, or 5, characterized in that, at larger need of bandwidth in uplink, said GSM-terminal utilizes GSM's data services.

8. System according to any of the patent claims 4-7, characterized in that said base station includes MSC, BSC and BTS.

9. System according to any of the patent claims 5-8, characterized in that said STB has a built-in radio equipment for GSM arranged for said interactive traffic and a SIM-card reader.

10. System according to patent claim 9, characterized in that the communication between user and STB is executed by means of a keyboard or a remote control.

11. System according to any of the patent claims 5-8, characterized in that an existing GSM-telephone can be directly connected to said STB, which telephone is connected to STB via a cable and a PC-card constituting interface between STB and said telephone, at which said telephone transmits said interactive control traffic to said base station.

12. System according to patent claim 11, characterized in that IR-technology is utilized as interface between said GSM-telephone and said STB.

13. System according to any of the patent claims 5-8, characterized in that a stand-alone GSM-telephone independent of said STB, transmits interactive control traffic to said base station, at which a user via said GSM-telephone controls said IC to control the broadband traffic in downlink to said STB.



1/5

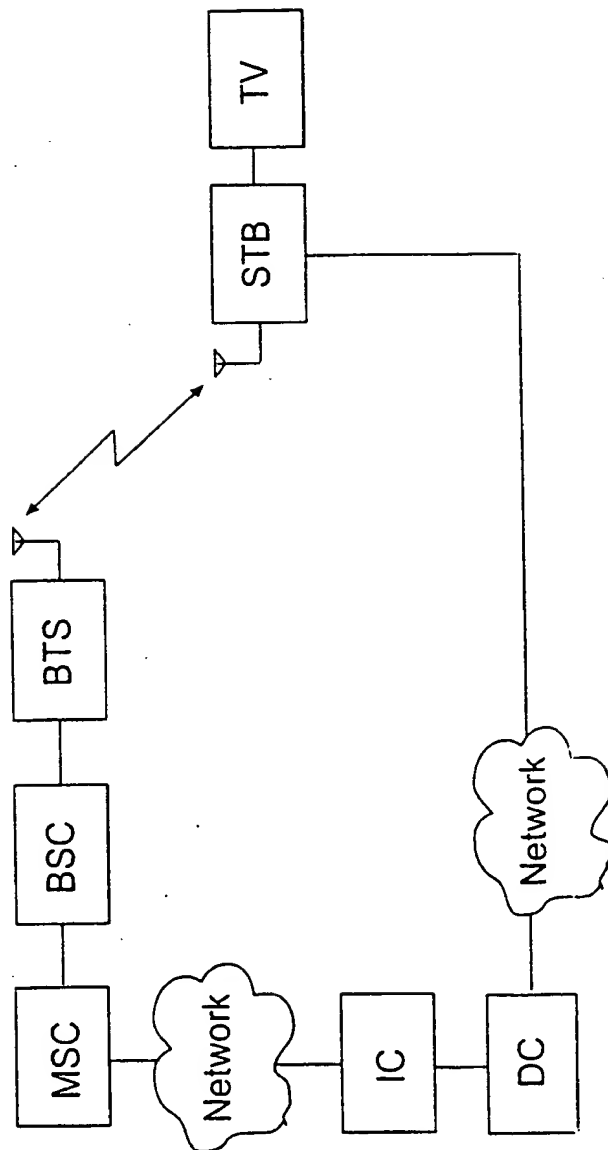


Figure 1

2/5

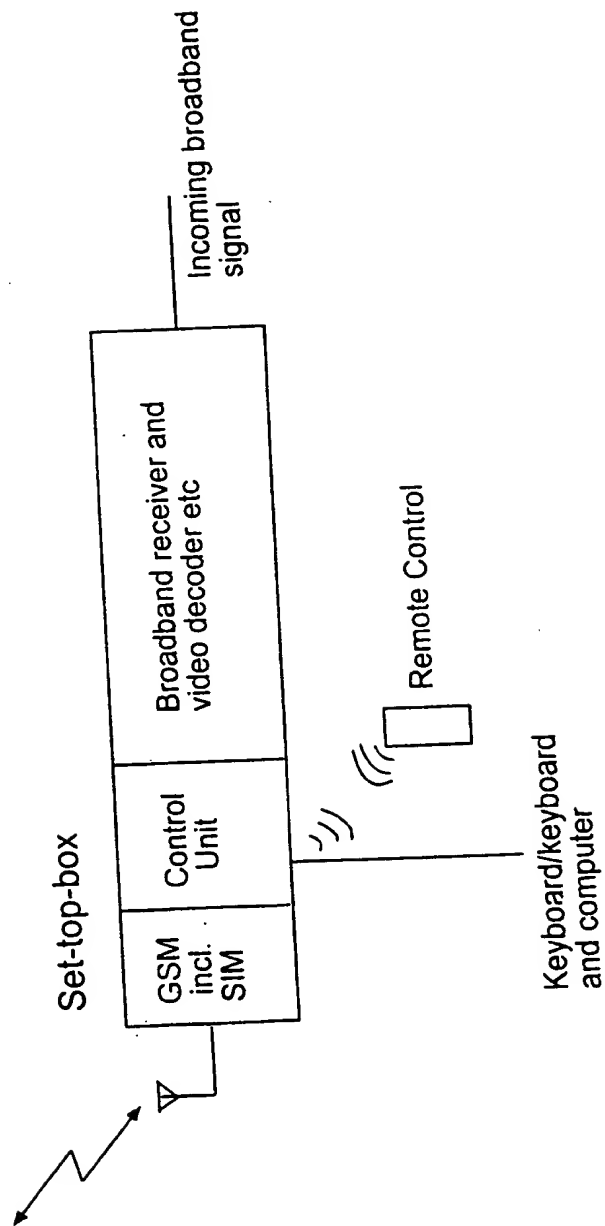


Figure 2

3/5

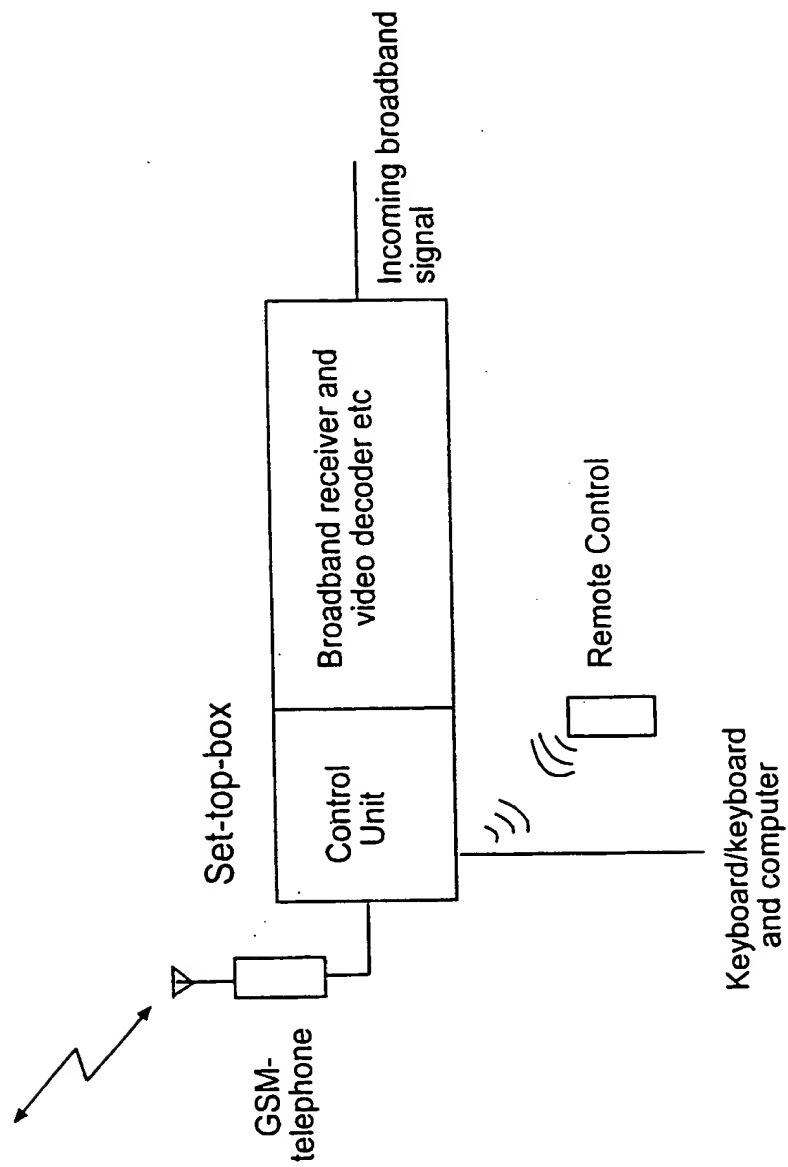


Figure 3

4/5

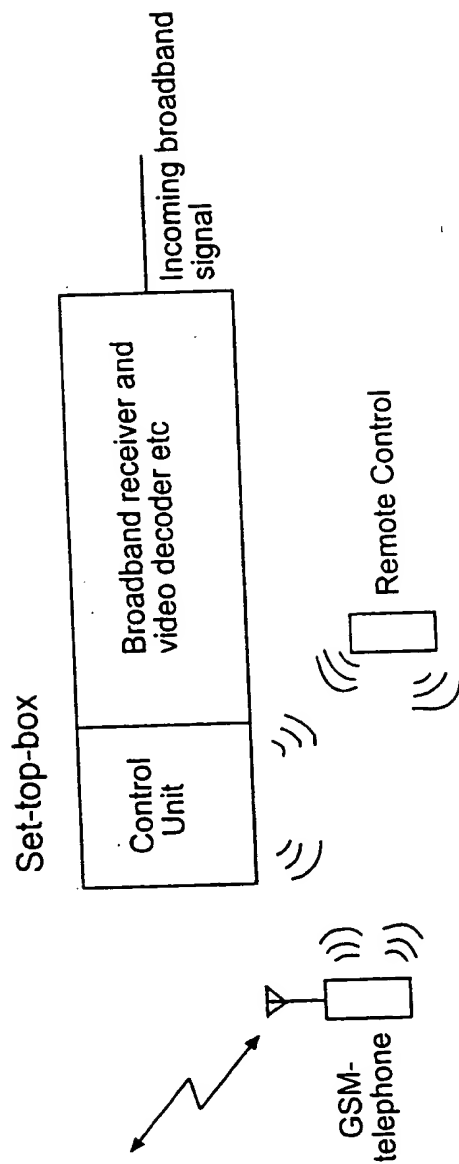


Figure 4

5/5

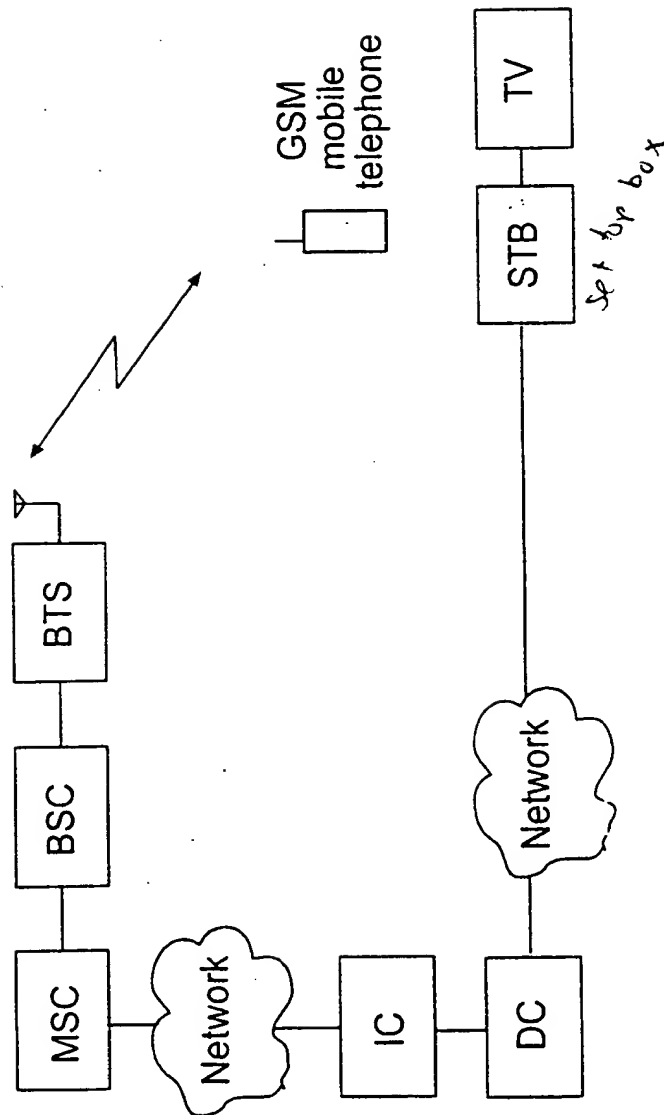


Figure 5

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/SE 98/00983

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04N 7/173, H04B 7/26

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04N, H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 4424380 A1 (DETEMOBIL DEUTSCHE TELECOM MOBILNET GMBH), 18 January 1996 (18.01.96), column 3, line 50 - line 65, claim 1	1
A	---	2-13
A	GB 2298544 A (GHAZALA SHAHEEN JAMIL MALIK), 4 Sept 1996 (04.09.96), see claim 4,8	1-13
	-----	

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

23 October 1998

Date of mailing of the international search report

27 -10- 1998

Name and mailing address of the ISA:

Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Rune Bengtsson  
Telephone No. +46 8 782 25 00

# INTERNATIONAL SEARCH REPORT

Information on patent family members

27/07/98

International application No.

PCT/SE 98/00983

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4424380 A1	18/01/96	NONE	
GB 2298544 A	04/09/96	GB 9504342 D	00/00/00

**THIS PAGE BLANK (USPTO)**